Coupling sugarcane supply management and payment systems models to improve mill value chain

S. AUZOUX, C. LEJARS

Contacts: sandrine.auzoux@cirad.fr, caroline.lejars@cirad.fr

Improving sugarcane supply planning and creating incentives to performance are two key actions that increase value generated by the sugar industry [1]. A simulation tool COMPA (COupling supply Management and PAyment system models) was implemented to explore new supply planning and quality-based payment solutions while facilitating negotiation between millers and growers.

Main issues addressed by COMPA are:

How to share the potential sugar value between growers and millers?

- ✓ *Selection of relevant cane payment system*
- ✓ *Assessment of cane quality along supply chain*

How to organize mill supply?

- ✓ *Choice of mill opening and closure dates*
- ✓ *Rules of allocation deliveries among growers.*

© Sandrine AUZOUX

Cane harvesting

© Caroline LEJARS

Sampling of deliveries

COMPA modelling structure

It 's the result of coupling two existing developed models: MAGI© [2], a simulation tool to address cane supply chain management issues, and PEMPA© [3], a decision support system to investigate the impact of different payment systems (figure 1).

COMPA simulates the cane crushing season on a weekly time basis, in a mill supply area. It calculates sugar production and the revenue sharing between growers and millers, according to quality deliveries and payment rules.

A wide range of supply and payment scenarios can be tested and compared.

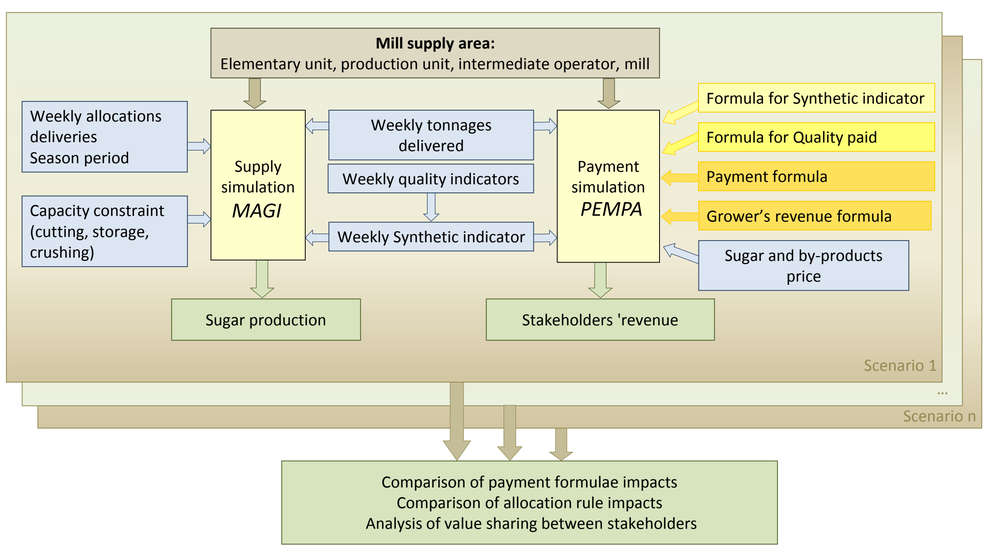

Figure 1: COMPA modelling structure

COMPA software architecture

COMPA database is the result of MAGI and PEMPA databases merging (figure 2).

The simulations are initiated by the COMPA user interface which controls MAGI and PEMPA user interfaces.

Supply or payment scenarios are configured along a chronological path:

1. Define the mill area structure
2. Characterize mill season period and planning weekly allocation deliveries
3. Define quality indicators used for payment system.

COMPA simulates first the mill supply throughout the season, and then calculates the weekly revenue shared between growers and millers.

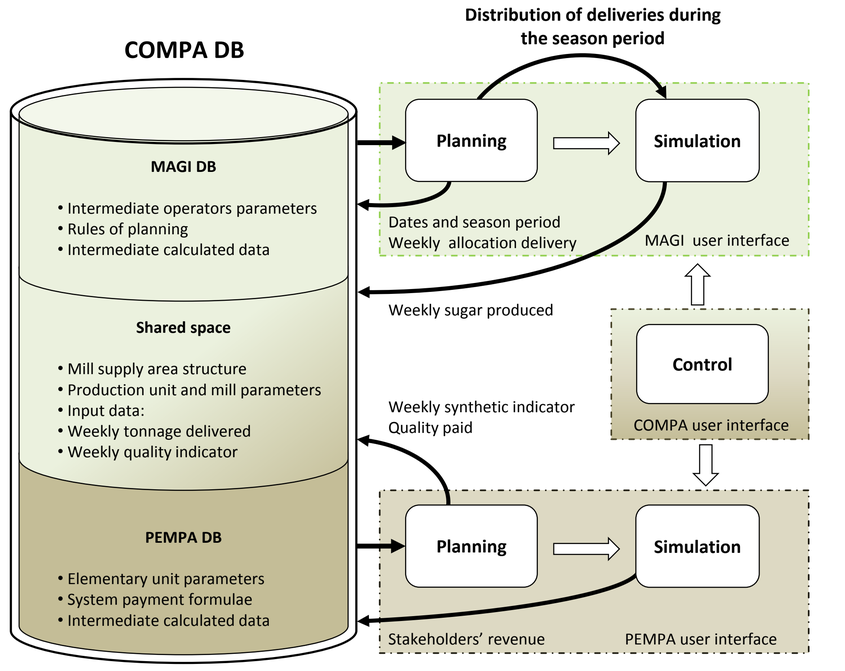

Figure 2: COMPA data structure and processing

Study case in Reunion Island

Le Gol mill area was divided into six sub-areas with different quality curves. Various cane supply scenarios based on these sub-areas were evaluated using COMPA (figure 3).

The simulated results showed:

1. Total sugar production could be increased by 2–5% by dividing the mill supply area into homogenous zones and adapting allocation according to cane quality variations.
2. The current payment system led to unequal sharing, though a relative payment system could provide win-win solutions.

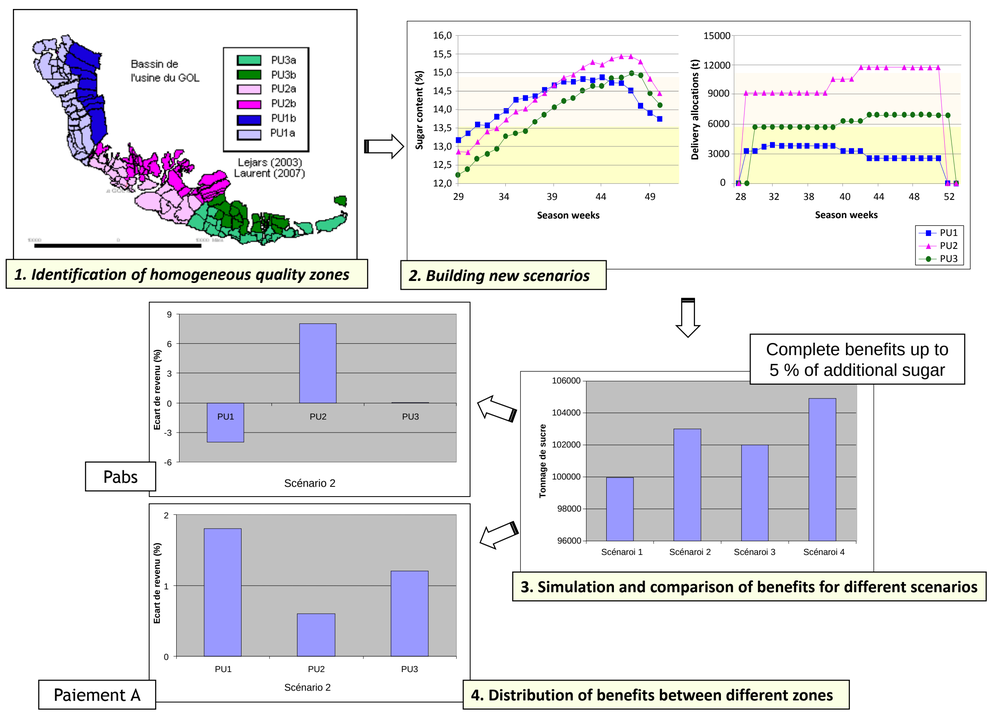

Figure 3: Example of conception and assessment of new systems in Reunion

COMPA increases transparency of payment system impacts on revenue sharing between stakeholders and facilitates the negotiation process between millers and growers. It can be used to support the design of new supply planning and alternative payment systems for multiple-purpose sugarcane. It's free software intended for researchers and industry professionals.

Higgins, AJ., Thorburn, P., Archer, A. and Jakku, E. (2007). Opportunities for value chain research in sugar industries. Agricultural Systems, 94 (3): 611-621.
Lejars, C., Le Gal, P.Y. and Auzoux, S. (2007). A decision support approach for cane supply management within a sugar mill area., Computers and electronics in agriculture,,60 (2): 239-249.
Lejars, C., Auzoux, S., Siegmund, B. and Letourmy, P. (2010). Implementing sugarcane quality-based payment systems using a decision support system. Computers and Electronics in Agriculture, 70 (1): 225–233.

©Cirad/UR URSCA – Irstea/UMR G-EAU, S. Auzoux & C. Lejars 2013